Amendments to the Claims

1. *(Currently Amended)* A seamlessly integrated hybrid optical network device ~~(20),~~ comprising: a semiconductor light source ~~(10)~~ mounted in a cavity in a silicon substrate ~~(11),~~ wherein the semiconductor light source ~~(10)~~ is fabricated from a non-silicon material; and a photonic bandgap ~~(PBG)~~ structure ~~(22)~~ seamlessly integrated with the semiconductor light source ~~(10)~~ to act as an optical wave guide for the photons emitted by the semiconductor light source ~~(10),~~ wherein the PBG structure ~~(22)~~ is etched directly in the silicon substrate ~~(11).~~

2. *(Currently Amended)* The seamlessly integrated hybrid optical network device ~~(20)~~ of claim 1, wherein the semiconductor light source ~~(10)~~ includes a surface covered in a reflective material ~~(25)~~ that blocks emission of photons through the surface.

3. *(Currently Amended)* The seamlessly integrated hybrid optical network device ~~(20)~~ of claim 2, wherein the surface includes an optical window ~~(24)~~ that allows photons to pass from the semiconductor light source ~~(10)~~ to the surrounding silicon substrate.

4. *(Currently Amended)* The seamlessly integrated hybrid optical network device ~~(20)~~ of claim 3, wherein the PBG structure ~~(22)~~ includes a plurality of porous columns realized in the silicon substrate adjacent to the optical window defined on the surface of the semiconductor light source ~~(10).~~

5. *(Currently Amended)* The seamlessly integrated hybrid optical network device ~~(20)~~ of claim 4, wherein the plurality of porous columns are arranged to define a channel that provides the wave guide for the photons emitted through the optical window.

6. *(Currently Amended)* The seamlessly integrated hybrid optical network device ~~(20)~~ of claim 1, wherein the emission of light from the semiconductor light source is regulated by a control system.

7. *(Currently Amended)* The seamlessly integrated hybrid optical network device ~~(20)~~ of claim 1, wherein the semiconductor light source ~~(10)~~ is fabricated from a material selected from the group consisting of: SiGe, SiGeC, InP, and GaAs.

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8. *(Currently Amended)* The seamlessly integrated hybrid optical network device ~~(20)~~ of claim 1, wherein the silicon substrate is fabricated from a material selected from the group consisting of: CMOS, high-speed SiGe, SiGeC, and BiCMOS.

9. *(Currently Amended)* The seamlessly integrated hybrid optical network device ~~(20)~~ of claim 1, wherein the semiconductor light source ~~(10)~~ comprises a bipolar transistor that can be biased into an avalanche condition to emit photons.

10. *(Currently Amended)* A method of fabricating a seamlessly integrated hybrid optical network device ~~(20),~~ comprising: providing a silicon substrate ~~(11);~~ etching a cavity ~~(41)~~ in the silicon substrate; etching a photonic bandgap ~~(PBG)~~ structure ~~(22)~~ in the silicon substrate ~~(11)~~ proximate the cavity ~~(41);~~ and placing a non-silicon semiconductor light source ~~(10)~~ in the cavity ~~(41).~~

11. *(Original)* The method of claim 10, wherein the silicon substrate is fabricated from a material selected from the group consisting of: CMOS, high-speed SiGe, SiGeC, and BiCMOS.

12. *(Currently Amended)* The method of claim 10, wherein the semiconductor light source (10) is fabricated from a material selected from the group consisting of: SiGe, SiGeC, InP, and GaAs.

13. *(Currently Amended)* The method of claim 10, wherein the PBG structure ~~(22)~~ includes a plurality of porous columns arranged to define a channel that provides the wave guide for the photons emitted from the semiconductor light source.

14. *(Currently Amended)* The method of claim 10, wherein the semiconductor light source ~~(10)~~ comprises a bipolar transistor that can be biased into an avalanche condition to emit photons.

15. *(Currently Amended)* A seamlessly integrated optical network ~~(13),~~ comprising: a non-silicon semiconductor light source ~~(10)~~ mounted in a silicon substrate ~~(11);~~ a photonic bandgap ~~(PBG)~~ structure ~~(22)~~ fabricated in the silicon substrate ~~(11)~~ and seamlessly integrated with the semiconductor light source ~~(10)~~ in the silicon substrate ~~(11)~~ that acts as an optical wave guide for photon pulses generated by the semiconductor light

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source ~~(10);~~ and a receiving device ~~(27a-d)~~ realized proximate a distal end of the optical wave guide for receiving the photon pulses generated by the semiconductor light source ~~(10).~~

16. *(Currently Amended)* The seamlessly integrated optical network of claim 15, further comprising a control system ~~(29)~~ for regulating the emission of photon pulses from the semiconductor light source ~~(10).~~

17. *(Original)* The seamlessly integrated optical network of claim 15, wherein the receiving device comprises a photo diode.

18. *(Currently Amended)* The seamlessly integrated optical network of claim 15, wherein the semiconductor light source ~~(10)~~ includes a surface covered in a reflective material ~~(25)~~ that blocks emission of photons pulses through the surface.

19. *(Currently Amended)* The seamlessly integrated optical network of claim 18, wherein the surface includes an optical window ~~(24)~~ that allows photon pulses to pass from the semiconductor light source ~~(10)~~ to the surrounding silicon substrate ~~(11).~~

20. *(Currently Amended)* The seamlessly integrated optical network of claim 19, wherein the PBG structure ~~(22)~~ includes a plurality of porous columns realized in the silicon substrate adjacent to the optical window defined on the surface of the semiconductor light source ~~(10).~~

21. *(Currently Amended)* The seamlessly integrated optical network of claim 15, wherein the semiconductor light source ~~(10)~~ is fabricated from a material selected from the group consisting of: SiGe, SiGeC, InP, and GaAs.

22. *(Original)* The seamlessly integrated optical network of claim 15, wherein the silicon substrate is fabricated from a material selected from the group consisting of: CMOS, high-speed SiGe, SiGeC, and BiCMOS.

23. *(Currently Amended)* The seamlessly integrated optical network of claim 15, wherein the semiconductor light source ~~(10)~~ comprises a bipolar transistor that can be biased into an avalanche condition to emit photon pulses.

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